

Maggie Gerdes

Honors Capstone

Methods for Teaching Children With Autism

Spring 2002

# University Honors Program

## Capstone Approval Page

Capstone Title: (print or type):

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Student Name (print or type):

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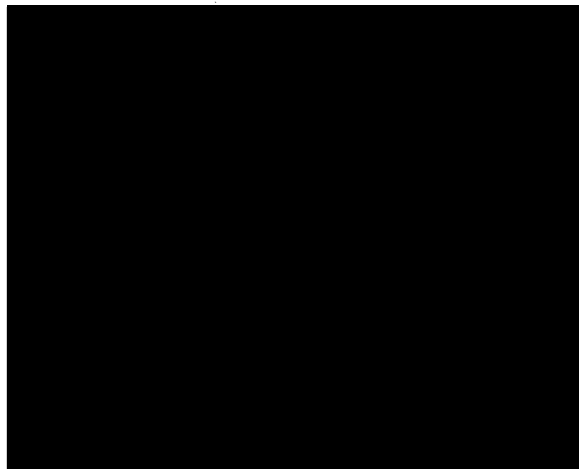
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REQUEST FOR UNIVERSITY HONORS INDEPENDENT STUDY LEADING TO THE  
COMPLETION OF THE HONORS CAPSTONE PROJECT

COVER SHEET

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- disorder. American Journal of Mental Retardation. 97. 377- 379.
- Meliachin., J.J., Smith., T., & Lovass, O.I. (1993). Long-term outcome for children with autism who received early intensive behavioral treatment. American Journal of Mental Retardation. 97. 359-372.
- Paneria, S., Ferrante, L., & Caputo, V. (1998). Use of structures teaching for treatment of children with autism and severe and profound mental retardation. Education and Training in Mental Retardation and Developmental Disabilities. 33, (4). 367-374.
- Powell, S. (2000). Helping children with autism to learn. London: David Fulton Publishers.
- Powell, S., & Jordan., R. (1997). Autism and learning: A guide to good practice. London: David Fulton Publishers.
- Schloss, P.J., & Smith, M.A. (1998). Applied behavior analysis in the classroom. Needham Heights, MA: Allyn & Bacon.
- Stromer, R., Mackay, H.A. (1996). Naming the formation of stimulus classes, and applied behavior analysis. Journal of Applied Behavior Analysis. 29, 409-31.

4. Describe the methodology of your proposed study. e.g., how will you approach the proposed topic? What is your research design? Is the study quantitative or qualitative? Is it performance art? Are you using primary, or secondary, sources as your database? Are you working in a specific creative genre? Are you using a statistical methodology? (One half to one page.)

I will be reading and studying articles and books on autism related to theories of autism, theories regarding the reasons for maladaptive behavior, and what instructional strategies are the best for educating children with autism. To do this, I will compare and contrast the different theories and instructional strategies. I will determine if commonalities exist among the theories and will identify how they differ. When focusing on specific intervention strategies, I will also compare and contrast the different models and will identify the most effective technique or strategy based on research literature.

- There are several theories for the causes of autism, which include: organic causes, genetic causes, the refrigerator mom, infectious disease, and prenatal, perinatal, and neonatal trauma.
- Children with autism have many stereotypical behaviors such as hand flapping, self-injurious behaviors, and tantrums for no apparent reason. Through functional analysis professionals try to determine what motivates children with autism to do these behaviors. Do they have sensory problems? Are they doing these behaviors for reinforcement, positive or negative? What exactly is the reason behind these types of stereotypical behaviors.
- I will be focusing on the four intervention models which include: Treatment and Education of Autistic and Related Communication Handicapped Children (TEACCH), Applied Behavior Analysis (ABA), The Eden Model, and Rita Jordan's


March 17	Rita Jordan, & Stuart Powell's use of a combination of theories and interventions: Theory behind it
March 24	Rita Jordan, & Stuart Powell's use of a combination of theories and interventions: what it is, how it is used, positives, & negatives
March 31	Conclusion
April 7	Revision
April 12	Turn in capstone to Toni Van Laarhoven
April 28	Corrections made (if any need to be) and turned in again (if it needs to be)

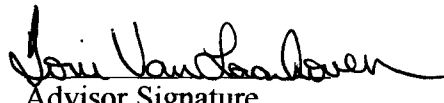
6. List the courses you have taken and experiences or activities you have had that provide a background for this study. (One quarter to one page.)

EPSE240	Introduction to Special Education
EPSE 380	Observation in Educational Settings
ETR434	Psycho educational Measurements
EPSE441	Characteristics of Developmental Disabilities
EPSE447	Behavior Modification
EPSE448	Problems Individuals with Physical Disabilities and Health Impairments
EPSE465	Signed English
EPSY300	Educational Psychology

## Amendment to Proposal

I will be focusing on the four intervention models which include: Treatment and Education of Autistic and Related Communication Handicapped Children (TEACCH), Applied Behavior Analysis (ABA), Sensoru Integration Therapy (SI Therapy), and Picture Exchange Communication System (PECS). TEACCH is an approach that "requires adaptations that must occur in three major areas of the child's life: home, school, and community. Starting with a comprehensive assessment the approach comprises a number of interconnected elements, which are based on structured teaching" (Cumine, V. et. al, 2000). The Applied Behavior Analysis theory is used for many children who had difficulties with learning, not just children with autism. This theory is based on Skinner's ideas about behavior. Skinner believed all behavior was learned and therefore could be changed by determining what the antecedent to a behavior is and what the reinforcement for that behavior is. Once the antecedent and reinforcer are determined, the person's behavior can be changed by not providing the reinforcer for inappropriate behavior and giving the reinforcer for the appropriate behavior. SI Therapy is based on the theory that child with autism have sensory dysfunction, which causes their brain to be unable to take in sensory stimulation and use that information. In order to correct this problem, children are engaged in a variety of activities and games to help train their senses how to organize and interpret sensory stimulation. PECS is a facilitative communication device in which two-dimensional pictures are used to help children communicate their wants and needs. It is based on the theory that children with autism have problems communicating which causes their behavior. I will compare and contrast these theories to determine which intervention theory works best for students with autism depending on their level of functioning and types of skills the student has problems performing. All of these theories are based on ideas about the causes of autism and why children with autism perform stereotypical autistic behavior.

  
Student Signature

  
Advisor Signature

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- Autism and vaccine research: Is there any scientific evidence that proves a linkage between autism and vaccines? (2001). National Institute of Child Health and Human Development [On-line]. Available: <http://www.nichd.nih.gov/publications/pubs/autism2.htm> [2001, December 28].
- Bondy & Frost. (1993). Proceedings of Association for Behavior Analysis: PECS.
- Browder, D. M. (2001). Curriculum and assessment for students with moderate and severe disabilities. New York, NY: The Guilford Press.
- Cermak, S. A. & Henderson, A. (1990). The efficacy of sensory integration procedures. [On-line]. Available: <http://www.sinetwork.org/Articles/EfficacyofSIProcedures/Efficacyarticle.htm>. [2002, March 12]
- Cohen, S. (1998). Targeting autism: What we know, don't know, and can do to help young children with autism and related disorders. London: University of California Press.
- Cumine, V., Leach, J., & Stevenson, G. (2000). Autism in the early years: A practical guide. London: David Fulton Publishers.
- Dorman, B. (1998). Intensive behavioral intervention. Autism-society [On-line]. Available: <http://www.autism-society.org/packages/discretionary.html> [2000, March 28].
- Freeman, B. J., (2000). Diagnosis of the syndrome of autism: Questions parents ask. Autism-society [On-line]. Available: [http://www.autism-society.org/packages/getstart\\_diagnosis.html](http://www.autism-society.org/packages/getstart_diagnosis.html) [2000, March 28].
- Fouse, B & Wheeler, M. (1997). A treasure chest of behavior strategies for individuals with autism. Arlington, TX: Future Horizons, Inc.
- Greenspan, S. I. (1992). Infancy and early childhood: The practice of clinical assessment and intervention with emotional and developmental challenges. Madison, CN: International Universities Press Inc.
- Harris, S. L., & Weiss, M. J. (1998). Right from the start: Behavioral intervention for young children with autism. Bethesda, MD: Woodbine House Inc.
- Hatch-Rasmussen, C. (2002). Sensory integration, Autism-society [On-line]. Available: [www.autism.org/si.html](http://www.autism.org/si.html). [2002, March 12].
- Henry, B. (1997). Sensory integration. [On-line]. Available: <http://webhome.idirect.com/~born2luv/sensory.html> [2002, March 12].
- Homes, D.L. (1998). Autism through the Lifespan: The Eden Model. Bethesda, MD: Woodbine House.
- Jordan, R. & Powell, S. (1995). Understanding and teaching children with autism. West

- Sussex: John Wiley & Sons Ltd.
- Kranowitz, C. S. (1998). The out-of-sync child: Recognizing and coping with sensory integration dysfunction. New York, NY: The Berkley Publishing Group.
- Maurice, C., Green, G., & Luce, S. C. (1996). Behavioral intervention for young children with autism: A manual for parents and professionals. Austin, TX: PRO-ED, Inc.
- Miller, L. J. & Kinnealey, M. (1993). Researching the effectiveness of sensory integration. [On-line]. Available: [http://www.sinetwork.org/JArticles/Researching%20Effectiveness%20of%20SILcover\\_research\\_effectivess.htm](http://www.sinetwork.org/JArticles/Researching%20Effectiveness%20of%20SILcover_research_effectivess.htm). [2002, March, 12].
- Panerai, S., Ferrante, L., & Caputo, V. (1998). Use of structures teaching for treatment of children with autism and severe and profound mental retardation. Education and Training in Mental Retardation and Developmental Disabilities, 33, (4), 367-374.
- Powell, S. (2000). Helping children with autism to learn. London: David Fulton Publishers, Ltd.
- Powell, S. & Jordan, R. (1997). Autism and Learning: A guide to good practice. London: David Fulton Publishers, Ltd.
- Schloss, P.J., & Smith, M.A.. (1998). Applied behavior analysis in the classroom. Needham Heights, MA: Allyn & Bacon..
- Schopler, E. & Mesibov, G. B. (1995). Learning and cognition in autism. New York, NY: Plenum Press.
- Schwartz, I. S., Garfinkle, A. N., & Bauer, J. (1998). The picture exchange communication system: communicative outcomes for young children with disabilities. Topics in early childhood special education, 18, (3), 144-159

**Abstract:** Autism is a developmental disorder that affects many children. Its causes are unknown. The focus of this paper will be providing a brief history of autism, diagnosing autism, and comparing and contrasting four intervention models which include: Treatment and Education of Autistic and Related Communication Handicapped Children (TEACCH), Applied Behavior Analysis (ABA), Sensory Integration therapy (SI therapy), and Picture Exchange Communication System (PECS)

TEACCH is an approach that "requires adaptations that must occur in three major areas of the child's life: home, school, and community. Starting with a comprehensive assessment, the approach comprises a number of interconnected elements, which are based on structured teaching" (Cumine et. al, 2000).

The Applied Behavior Analysis theory is used for many children who have difficulties with learning, not just children with autism. This theory is based on Skinner's ideas about behavior. Skinner believed all behavior was learned and therefore could be changed by altering antecedents and consequences to behavior. Once the antecedent and reinforcer are determined, the persons' behavior can be changed by not providing the reinforcer for inappropriate behavior and giving the reinforcer for the appropriate behavior.



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# **What is Autism**

Autism was not known to the world until Leo Kanner's study in 1938 (Cumine et. al., 2000). . Kanner was a child psychiatrist and his study began when a boy named Donald, who was brought to him (Cumine et. al., 2000). Donald had peculiar behaviors. For example, he was able to name all the Presidents and recite other information since a very young age. However, Donald did not have any normal conversation skills. Kanner was introduced to more children with similar characteristics. He labeled these children as having "early childhood autism", he defined as "a profound autistic withdrawal, an obsessive desire for the preservation of sameness, a good rote memory, an intelligent and pensive expression, mutism or language without real communicative intent, oversensitivity to stimuli, and a skillful relationship to objects" (Cumine et. al., 2000, p.1). His belief was that children with autism were intelligent but that "early childhood autism" was the cause of all the child's delays (Jordan & Powell, 1995). It is now known that the cause of most children with autism's is other learning problems (Jordan & Powell, 1995)

Word of Kanner's study spread and more children began to be diagnosed with early childhood autism (Cumine et. al., 2000). Some researchers, however, believed the definition for early childhood autism was too narrow. Lorna Wing and Judith Gould expanded the definition in 1979 (Cumine et. al., 2000). They conducted a study in London, in which they looked at children with many different disabilities and levels of severity, trying to pinpoint the defining characteristics of early childhood autism. Through their study they developed the "Triad of Impairments" (Cumine et. al., 2000). The triad of impairments was the title they gave to the major impairments they pinpointed as characteristics of children with autism: impairments in social interaction, impairments

in social communication, and impairments in social imagination (Cumine et. al., 2000).

The term early childhood autism was broadened and changed to the "Autistic spectrum"

which emphasized the wide variety of abilities and impairments in children with autism

(Cumine et. al., 2000). Since that time, little has changed in the definition of autism. The

triad of impairments is still used as the basis for diagnosing autism (Cumine et. al.,

2000).

Some believe a diagnose of autism can cause others to discriminate against a child (Cumine et. al., 2000). It has also been theorized that by labeling a child as autistic, parents and professional who work with the child to feel that the child's behaviors and delays are inevitable, ultimately causing a decline in the child's quality of instruction (Cumine et. al., 2000). Parents say however, that the diagnosis of autism can alleviate frustration and allow them to understand their child's behavior (Cumine et. al., 2000). A diagnosis can also lead to early intervention, which will affect the child's development positively (Cumine et. al., 2000).

"It is now possible to diagnose autism before the age of 3" (Cumine et. al., 2000, p. 13). At 18 months, a child displays enough characteristics to be diagnosed with autism (Cumine et. al., 2000). "Distinguishing impairments are noted in the following areas:

- Eye Contact;
- Orienting to own name;
- Joint attention behaviors e.g. pointing, showing;
- Pretend Play;
- Imitation;
- Non-verbal communication;
- Language Development" (Cumine et. al., 2000, p.14).

Early diagnosis can allow a child to receive services early which will improve the child's developmental outcome (Cumine et. al., 2000).

Unlike many other conditions, autism can not be diagnosed through medical tests (Dorman, 2001, Freeman, 2001). Medical tests may be used however, to rule out the presence of other medical conditions with similar characteristics (Dorman, 2001). For this reason, it is difficult to diagnose autism. Diagnosis is complicated further due to the

fact that many children with autism have other conditions as well (Cumine et. al., 2000, Dorman, 2001).

In order to diagnose autism, a child may be evaluated by a number of professionals including, but not limited to a neurologist, psychologist, developmental pediatrician, speech/language therapist, and a learning consultant (Dorman, 2001). This team of professionals will conduct assessments, in their field, to determine where a child performs within the normal range of abilities and where the child performs below the normal range of abilities (Dorman, 2001). A complete analysis of a child's skills should include: "a thorough developmental history, background medical information, information from any therapeutic intervention undertaken, educational history and evaluation of progress, child observation and interaction, and clinical judgement" (Cumine et. al., 2000, p.15). Information should be taken from many different settings including the child's home, school environment, and specialist settings (Cumine et. al., 2000). The assessors should be looking at how the child interacts socially, how the child communicates, and the child's imaginative play skills (Cumine et. al., 2000). Interviews with parents and other caregivers can provide information about the child's development, behavior, and medical history (Cumine et. al., 2000). The information obtained in these interviews is critical because enough information about the child's behavior and background can not be obtained through observation (Cumine et. al., 2000).

Many doctors see very few cases of autism in their career and often they are not familiar with autism or with the full spectrum of autistic characteristics (Cumine et. al., 2000, Maurice et. al., 1996). Consequently they are often timid in giving a child the diagnosis of autism (Cumine et. al., 2000, Maurice et. al., 1996). A child may be sent to

many doctors before a diagnosis of autism is considered (Cumine et. al., 2000, Maurice et. al., 1996). The diagnosis of autism is also subjective and doctors need to have a sound background knowledge, which should comprise knowledge about:

- normal child development,
  - abnormal developmental characteristics of autism,
  - characteristics of disorders similar to autism,
  - the severity of an impairment,
  - how to conduct an assessment,
  - and understanding and evaluating results.
- (Cumine et. al., 2000)

Most doctors do not have enough background knowledge to make a diagnosis of autism and that is why other professionals help in the diagnosis (Cumine et. al., 2000, Maurice et. al., 1996). It can be a long road to getting a diagnosis (Cumine et. al., 2000, Maurice et. al., 1996). When a parent believes there is something wrong with a child he/she will most likely take that child to a doctor (Cumine et. al., 2000, Maurice et. al., 1996). If that child has autism, a doctor may not recognize it because of his/her lack of knowledge about autism (Cumine et. al., 2000, Maurice et. al., 1996). The parent and child may be sent to many different doctors before a diagnosis of autism is considered and tested (Cumine et. al., 2000, Maurice et. al., 1996).

The first step to determining if a child has autism is to perform a screening. Simon-Cohen and colleagues developed the Checklist for Autism in Toddlers (CHAT) in 1992 to screen young children with autism (Cumine et. al., 2000). A screening is not to be used as a diagnostic tool, it is meant to determine whether or not to further investigate the possibility of autism (Cumine et. al., 2000). The *Childhood Autism Rating Scale* (CARS) is used to screen children over 24 months of age (Cumine et. al., 2000). Once a



professional has screened the child, the results are then interpreted (Cumine et. al., 2000). If the results of the screening show that there is a possibility that the child has autism, a full and comprehensive assessment is conducted (Cumine et. al., 2000). Currently, there are two major assessments that are used: the *Diagnostic and Statistical Manual of Mental Disorders, 4th Edition*, American Psychiatric Association (DSM IV) and *International Classification of Diseases*, World Health Organization (ICD 10) (Cumine et. al., 2000).. If the assessment shows that the child has autism, then the diagnosis of autism is given (Cumine et. al., 2000).

Autism cannot be as clearly defined as other disabilities such as cerebral palsy or Down Syndrome. Much of the current definition of autism is open to interpretation. The *American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders 4th Edition* (1994) states that autism is "a disorder that manifests itself in infancy, severely affects the development of social interaction and communication skills and results in the presence of stereotypical behaviors, interest, and activities" (Holmes, 1998, p.11).

Autism is also "one of the most prevalent developmental disorders" (Holmes, 1998, p.12). Approximately one in every 1000 births will be diagnosed with autism and four times as many boys are affected than girls (Holmes, 1998). Autism can be found in any economical status, social class, racial group, or ethnic origin (Freeman, 2001). There seems to be no clear causes for autism biological or environmental, which affects its onset (Cohen, 1998, Cumine et. al., 2000, Freeman, 2001, Jordan & Powell, 1995, Leach, & Gill, 2000, Maurice, Green, Luce, 1996).

Despite the prevalence of autism, it remains, in many ways, a mystery. To date, there is no known cause of autism (Freeman, 2001). Diagnosis is still based primarily on observation of a child's behavior and the elimination of other possible diseases or causes (Cumine et. al., 2000, Maurice et. al., 1996). Many professional medical personnel and teachers are unaware of how to work with children who have autism and are unsure of how to deal with their behaviors (Freeman, 2001). Many are also unaware of similar diagnosis and how to determine the difference between other pervasive developmental disorders and autism (Cohen, 1998, Freeman, 2001).

Autism is categorized as a pervasive developmental disorder or PDD in the 4<sup>th</sup> Edition of the *Diagnostic and Statistical Manual*. PDD's are disorders in which a person has "severe and pervasive impairment in several areas of development" (Freeman, 2001, www.autism-society.org). Several disorders that are similar to autism fall within the PDD category (Cohen, 1998, Freeman, 2001). These similar disorders are sometimes seen as different types of autism, however that assumption is false. They differ from autism in relation to the severity of communication and social impairments. The conditions that fall under the category of PDD include: Asperger's Syndrome, Pervasive Developmental Disorder- not otherwise specified, Rett's Syndrome, Autism, and Childhood Disintegrative Disorder (Cohen, 1998, Freeman, 2001). As stated above, autism affects a person's social interaction, communication, and imaginative play skills and is accompanied by stereotypical behaviors, interests, and activities (Cohen, 1998, Freeman, 2001, Holmes, 1997, Jordan & Powell, 1995, Maurice et. al, 1996, Panerai, Ferrante, Caputo, 1998). What are the characteristics of the other PDD disorders?

Asperger's Disorder differs from autism in that there is no presence of language delays and individuals have average to above average intelligence (Cohen, 1998, Freeman, 2001). Children with Asperger's Syndrome are often clumsy and described as loners (Cohen, 1998). These individuals show interest in others however, they do not have the social skills to interact with their peers. They often engage in long-winded one-sided conversations about their own interests and are unable to understand non-verbal forms of communication. Children with Asperger's Syndrome are sometimes described as lacking "common sense" (Cohen, 1998).

When a specific category of diagnosis can not be made an individual may be given the diagnosis of Pervasive Developmental Disorder - not otherwise specified (Cohen, 1998, Freeman, 2001). This means the child's deficits are severe and pervasive in several areas of development, however his/her particular characteristics do not fall under any currently known PDD (Cohen, 1998, Freeman, 2001). A diagnosis of Pervasive Developmental Disorder - not otherwise specified may have unintended negative side effects (Cohen, 1998). Parents may feel confused about their child's disabilities and they may also have difficulties in obtaining early intervention services for their child (Cohen, 1998).

Unlike autism in which four times as many males are affected as females, only females have been known to have Rett's Disorder (Cohen, 1998, Freeman, 2001). Individuals with Rett's Disorder develop normally at first and then regress and lose the ability to control their hands (Cohen, 1998, Freeman, 2001). Once this occurs the hands are often engaged in repetitive movement that seems to be nonfunctional (Cohen, 1998, Freeman, 2001).

The final category under the PDD title is Childhood Disintegrative Disorder. Children with Childhood Disintegrative Disorder seem to be developing normally during their first two years of life and then they begin to lose the ability to perform previously acquired skills (Cohen, 1998, Freeman, 2001). There are several areas that Childhood Disintegrative Disorder affects: Language, social skills, play skills, motor skills, and bladder control (Cohen, 1998). This disorder has a very poor prognosis and is associated with severe mental retardation. As of today, a genetic marker or other evidence has not been discovered that can distinguish Childhood Disintegrative Disorder from autism

(Cohen, 1998). All of these disorders are similar to autism but should not be confused as part of the autistic spectrum (Cohen, 1998, Freeman, 2001).

What are the key features or stereotyped behaviors used to describe autism? The Autism Society website provides a checklist of autistic behaviors (Freeman, 2001). The number and extent to which the behaviors listed below are present in individuals with autism can vary greatly.

- "1. Difficulty in mixing with other children
2. Insistence on sameness, resists changes in routine
3. Inappropriate laughing and giggling
4. No real fear of dangers
5. Little or no eye contact
6. Sustained odd play
7. Apparent insensitivity to pain
8. Echolalia (repeating words or phrases in place of normal language)
9. Prefers to be alone; aloof manner
10. May not want cuddling or act cuddly
11. Spins objects
12. Not responsive to verbal cues; acts as deaf
13. Inappropriate attachment to objects
14. Difficulty in expressing needs; uses gestures or pointing instead of words
15. Noticeable physical overactivity, or extreme underactivity
16. Tantrums - displays extreme distress for no apparent reason
17. Unresponsive to normal teaching methods
18. Uneven gross/fine motor skills (may not want to kick ball but can stack blocks)" (Freeman, 2001, [www.autism-society.org](http://www.autism-society.org)).

Although this list is not meant as a diagnostic tool for autism, it does provide one with an idea of the characteristics and behaviors engaged in by children with autism.

The question of "What is autism", is difficult to answer. Two children both diagnosed with autism maybe completely different from one another because autism is a spectrum disorder, which has many characteristics that may or may not be present in any one individual.. The common threads in autism are impairments in social interaction, communication, , and imaginative play, which can vary greatly in severity (Cohen, 1998,

Freeman, 2001, Holmes, 1998, Jordan & Powell, 1995, Panerai et.al., 1998, Maurice et. al., 1996). Autism is a disorder, we as a society, do not fully understand today, but may one day we will with continued research.

# **Causes of Autism**

Today, experts still do not know what causes autism. There are many promising theories as well as a few theories that are highly unlikely. "What research has been able to determine is that autism is a biologically based disorder, correlated with several secondary conditions, none of which in itself fully explain autism" (Holmes, 1997,20). Below are some of the major theories about the causes of autism.

### **Refrigerator Mom**

Bruno Bettelheim developed one of the first theories about the cause of autism, in 1967. He coined the term "refrigerator mom" (Holmes, 1998). Bettelheim believed children were autistic as a direct result of their environment (Holmes, 1998). In his theory, children with autism did not have loving and caring mothers which caused them not develop normally and retreated into their own world at times (Holmes, 1998). Bettelheim treated children with autism by taking them out of the home (Holmes, 1998). Today Bettelheim's theory is no longer considered as a cause of autism (Holmes, 1998).

### **Genetics**

It has been theorized that autism has a genetic link (Cumine et. al., 2000, Holmes, 1998). One reason why researchers believe autism may be linked to our genes is due to the fact that four times as many boys as girls have autism (Cumine et. al., 2000, Holmes, 1998), suggesting it could be linked to the sex chromosomes (Cumine et. al., 2000, Holmes, 1998). Studies have also shown that it is more likely for identical twins (those who share the same chromosomal makeup) to both have autism than it is for fraternal twins (from two different fertilized eggs) to both have autism (Cumine et. al., 2000, Holmes, 1998). "(F)amily studies strongly suggest that genetic factors can be implicated in some cases of autism, although the mode of inheritance is unknown"



(Holmes, 1998, 21). A problem with this theory is that not every identical twin that has autism will have an identical twin with autism (Cumine et. al., 2000, Holmes, 1998).

### **Infectious Diseases**

It has been documented that some infectious diseases are correlated with autism. Toxoplasmosis, rubella, cytomegalovirus, and herpesvirus are referred to as TORCH. TORCH is a group of infections that research has shown to be correlated with autism (Holmes, 1998). This relationship may or may not mean the infections cause autism (Holmes, 1998).

### **Vaccines**

According to the National Institute of Child Health and Development it has been suggested that autism is caused by a reaction to the measles/mumps/rubella (MMR) vaccine (2001). Parents often recall their child developing normally until he/she receives the MMR vaccine. In Lancet, a study was conducted by Wakefield and his colleagues in 1998 (National Institute of Child Health and Development, 2001). There was no scientific analysis done in the study and it is not known how the 12 patients were selected for the study. Although the researchers stated MMR is a cause the study was unreliable. Another study was conducted in 1999, by the Working Party, as stated by the National Institute of Child Health and Development (2001). Several hundred reports were collected and studied to determine if MMR was a cause of autism. From these reports, it was concluded that the MMR vaccine was not the cause of autism. Currently the Centers for Disease Control and Prevention (CDC) is conducting a case-control study of the association between autism and the MMR vaccine in Atlanta, Georgia (National

Institute of Child Health and Development, 2001). As of today, there is not any reliable data that has proven a relationship between autism and the MMR vaccine.

### **Neurobiological Findings**

Neurobiological abnormalities have been discovered in individuals with autism. During the 70's and 80's, computerized tomography (CT) scans were used by experts to view the brain of children with autism (Holmes, 1998). They found inconsistent results of enlarged ventricles and cerebral asymmetries in the brains of children with autism (Holmes, 1998). Once magnetic resonance imaging (MRI) were developed, they were used to confirm the CT scan's findings as well as discover smaller cerebellar areas (Holmes, 1998).

A pediatric neurologist at Boston City Hospital named Margaret Bauman, identified abnormalities in the limbic system, cerebellum, and cerebella circuits in children who had autism (Holmes, 1998). "To date these abnormalities have included: 1) a marked loss of Purkinje cells, 2) retention of the fetal "circuits" that connect key neurons with the rest of the central nervous system, and 3) increased numbers of neurons in specific regions of the limbic system, hippocampus, and amygdala" (Holmes, 1998,22). Bauman has hypothesized that autism is a disorder that interferes with early brain development, especially of the limbic system, which is associated with normal behavior, cognition, and memory. These neurobiological findings may be one of the causes of autism (Holmes, 1998).

### **Neurochemical Causes**

Research has shown neurochemical differences in children with autism (Holmes, 1998). High levels of serotonin are found in 25-40% of children and

adolescents with autism (Holmes, 1998). Dopaminergic and endogenous opioid systems neurochemicals were also noticed in the research, however they are unsure of the meaning of this research (Holmes, 1998).

### **Prenatal, Perinatal, and Neonatal Trauma**

Studies have been conducted to determine the relationship between prenatal, prenatal, perinatal, and neonatal trauma and autism (Holmes, 1998). According to Holmes, researches looked at the mother's age, post-maturity, delivery complications, low Apgar scores, respiratory distress, and hyperbilirubinemia (1998). Clear connections between any of these factors and autism were unable to be made by current research. Prenatal, perinatal, and neonatal trauma may be the cause of autism for some children, but it is highly unlikely it is the cause of autism for all children (Holmes, 1998).

# **Understanding Autistic Behavior**

There are many factors that affect the way children with autism behave. It is believed that many children with autism have problems with memory, emotion, social interaction, generalization, and sensations which affect the way they interpret their world and to some extent determines how they react.

### Sensory Issues

Hypersensitivity is "a tendency to react negatively or with alarm to sensory input that is generally not irritating or harmful for individuals in the normal population" (Fouse & Wheeler, 1997, p.4S). According to Fouse and Wheeler, children who are hypersensitive feel sensations at a much higher level than others (1997). A slight touch can be painful for these children, causing them to lash out or escape from these situations. Clothing may even seem aversive to children who are hypersensitive. At times, hypersensitivity may be interpreted as misbehavior especially if a child is continuously trying to strip off his/her clothes. Hypersensitivity is a real issue in which children with autism may be dealing. For children who are hypersensitive, the world can be a very unpleasant place (Fouse & Wheeler, 1997).

Fouse and Wheeler also believe that a child can also be hyposensitive (1997). Children who are hyposensitive may not sense any stimulation unless it is a level that is aversive to most individuals. These children seem to ignore the world around them and may even use self-injurious behavior or SIB in order to receive any sensory stimulation. Imagine living your life without being able to feel anything except that which causes pain for most people; this is the life of a child who is hyposensitive (Fouse & Wheeler, 1997).

## Memory

According to Jordan and Powell, memory problems can also cause children with autism to behave strangely (1995). They believe the episodic recall part of memory does not function properly in children with autism (1995). Episodic recall deals with the recalling of events. Within the episodic recall resides autobiographical material, which is the most difficult for children with autism to recall. They also state that having difficulties with recalling autobiographical material leads to children with autism being incapable of remembering what has happened to them throughout the day, week, year, or even their life (1995). However this information can be tapped through cueing. Here is an example of how the episodic memory can be triggered through cueing. For example, A teacher asks a pupil if he/she saw a fire engine that morning on the way to school.. This "cueing" triggers the child's autobiographical material in the episodic memory and the child is able to recall seeing the fire engine. On the other hand, if the teacher had simply asked what the child had seen on the way to school; the child most likely would have only stated "trees, cars, etc." things the child sees everyday on the bus ride to school.. Fears and echolalia may also be triggered by cueing the episodic memory. For example, if a child is asked "Did you see a spider?" and the child was afraid of the spider this reaction could be triggered if the memory is cued (Jordan & Powell, 1995).

Jordan and Powell believe the inability to use memory adequately may be the reason many children with autism "parrot respond" to questions or simply stated repeat the question asked (1995).. The child cannot recall the answer and so repeats the question because he/she does understand the need for a response. Memory problems may also be part of the reason children with autism have problems generalizing information, which is

the act of taking current knowledge and applying it to another situation or problem (Jordan & Powell, 1995).

## **Social**

Often, children with autism do not develop social skills through observation and interaction, which is how the general population acquires social skills formed (Jordan & Powell, 1995). Jordan and Powell believes this inability to develop social skills naturally is the reason many children with autism do not understand forms of communication like facial expressions and body language (1995). They also do not understand social etiquette and how to interact with others formed. According to Jordan and Powell, in order to learn social skills, children with autism must be directly taught (1995). If children with autism are not taught how to handle or decode social situations, they may become frustrated and behave inappropriately due to a lack of understanding. Social impairment causes many problems for children with autism (Jordan & Powell, 1995). As stated by Jordan and Powell, they may only have a few friends, because they are unable to interact appropriately with peers (1995). Parents and teachers may not realize the child's social skills deficits and therefore reprimand the child for inappropriate behavior. Operating within the community can become a problem as the child gets older if social skills instruction is not implemented (Jordan & Powell, 1995).

## **Generalization**

Because children with autism often do not understand their world, and are unable to generalize information, slight changes may be extremely frightening (Cohen, 1998). For example, going to Target<sup>TM</sup> rather than Walmar<sup>TM</sup> would seem as a trivial change in routine for most people, however a child with autism may not understand that Target<sup>TM</sup> is

a store that sells many of the same items as Walmart (Cohen, 1998). Without generalization skills, the child can not recognize the similarities between the two stores and therefore, may react negatively to the change in routine (Cohen, 1998). Sean Barron, an adult who has autism, said that as a child, he enjoyed things that were repetitious because the repetition made him feel safe. (Cohen, 1998). Without the skills to generalize and connect current knowledge to one's environment, the world can become a frightening and uncertain place (Cohen, 1998).

Part of understanding autistic behavior is realizing that many children and adults with autism do not have the same understanding of the world as people within the normal population. Autism affects many areas of development that cause children with autism to behave differently than one would expect. In order to comprehend the behaviors of a child with autism one must take a deeper look into the child's development.



## Theory:

In 1966 in North Carolina Eric Schopler and his colleagues began a federally funded research project that developed into a method of instruction called TEACCH (Treatment and Education of Autistic and Communication Handicapped Children) (Cumine et al., 2000). Through their work with children who have autism and their families, Schopler and his colleagues formulated the idea that "autism stemmed from some form of brain abnormality, rather than from 'refrigerator parenting'" (Cumine, et al., 2000, p. 41). Instead of wanting children to be separated from their parents, which is what Leo Kanner recommended, Schopler believed parents should be taught to understand their children and how to help educate them (Cumine et al., 2000).

Through their work, Schopler and colleagues theorized that the world was extremely confusing for children with autism and that visual methods of instruction produced the best results in educating children with autism. From these observations, Schopler and his colleagues developed a structured teaching strategy that relied on visual methods for instruction (Cumine et al., 2000).

## What is TEACCH:

According to Schopler as reported by Panerai, Ferrante, and Caputo "(t)he TEACCH program is described as a comprehensive and primarily educational program, which includes diagnostic evaluation, individualized treatment, and special education for children with autism and communication handicaps" (1986,

<http://fristsearch.oclo.org/IFETCH:.....tmVfsfulltext.htm%22:/fstxt5.htm....>). It emphasizes children's abilities rather than their disabilities. "TEACCH is a whole life approach to helping people with autism, which aims to equip children for a productive life in the community. It sets out to

provide visual information, structure, and predictability, as it is recognized that the optimum learning channel is visual" (Cumine et. al., 2000, 40). In an 18 month, study conducted by Panerai et. al., (1998) they found an overall improvement in participants' competence and spontaneous communication and a significant decrease in behavioral problems. However, they found only minor improvements in interpersonal relationships, communication attention, association,, emotion,, instinct, and regulation, which may be due to the short duration of the study. The researchers did note that the decrease in behavioral problems was most significant during the structured activities and found an increase in behavioral problems during unstructured activities (Panerai et. al., 1998).

### **Procedure:**

The first step in the TEACCH program is the diagnosis of autism or another communication related disorder. Autism is diagnosed using the Childhood Autism Rating Scale (CARS) and the Psychoeducational Profile (PER-P), as well as observational information gathered from teachers, parents, and other caregivers (Cumine et. al., 2000). The child's skills are then assessed to determine what skills need improvement and what skills the child already possess. Once this has been determined, goals are set for each child and instruction begins.

There are 4 major components within TEACCH,, that help children work towards, their educational goals (Schopler & Mesibov, 1995). The first component deals with the layout of the room or the physical organization of the classroom. The room should have clearly defined areas/centers in which only one particular type of activity is performed. For example, the snack area should only be used for eating and should never be used for art activities. This allows students to anticipate what they will be doing when they arrive

at a center.. Because of the problems children with autism have with maintaining attention, the room should have as few visual and auditory distractions as possible. This will also help those students who are hypersensitive to not feel overwhelmed. Using partitions and bookshelves to separate centers allows for less distraction between two centers and also clearly divides two centers. An instructor should keep in mind that free play areas should not be near exit areas where children may be likely to leave the room; bathrooms should either be in the classroom or very close to the classroom to keep students from spending a large amount of time going to and from the bathroom. The centers within the room should be developmentally appropriate so that the greatest amount of learning can happen. Transition areas are also essential.. They help to relieve the stress some children with autism have in dealing with changing tasks. Schedules can be easily placed here so that children see where they are to go next and what they will do there (Schopler & Mesibov, 1995).

Schedules are the second component to TEACCH (Schopler & Mesibov, 1995). They give structure to the class and allow students to anticipate in what sequence events will occur. There are five reasons why schedules help children with autism:

- 1) "They minimize problems of impaired memory or attention
- 2) They reduce problems with time and organization
- 3) They compensate for problems with receptive language, which also cause obstacles to following verbal directions.
- 4) They foster students independence, especially from negative teacher interaction over the repeated need to know what comes next
- 5) They increase self-motivation by reading available visual reminders that 'first comes work, then comes play'" (Scholper, E., & Mesibov, G., 1995, p. 251).

TEACCH generally uses two kinds of schedules: the classroom schedule and each student's individual schedule. While the class schedule may not be specific and adjusted

to the child's level, the individual schedule is very specific and adjusted specifically for that child's level. For those students who are functioning on a concrete level of thinking objects can be used to show what the schedule will be. Colors, pictures, numbers, and words can be used for students functioning at a higher level to show their schedule. For some students, the instructor may want to make the activities on the student's schedule detachable. Velcro could be used to attach the activities to the schedule, for example. When it is time for a particular activity the student can detach the activity's square and takes it to that activity's center where it is then placed in a designated area. After the activity has been completed the student can then take the activity's square back to his/her schedule and place it in the finished envelope. Showing the student what he or she has accomplished so far that day (Schopler & Mesibov, 1995).

Work systems are the third component of TEACCH (Schopler & Mesibov, 1995). Within a center or activity area, work systems are setup to give students directions about what they are to do while in the center. This allows students to work independently and be aware when they have completed the task or tasks within the center. Resembling schedules, work systems can also be adjusted to the child's developmental level. The simplest level uses objects and then in increasing difficulty, color-coding, pictures, numbers, and words. "The work system provides the student with visually clear information on what the learning task is about, how many things are to be done, how many things have already been completed, and the outcome to expect" (Schopler, & Mesibov, 1995, p. 258).

In order for students to know how to perform a particular task in the work system and in what order components of the tasks are to be performed, jigs (or step by step

instructions) are given to students (Schopler & Mesibov, 1995). Jigs allow students to perform tasks on their own. They can be adapted in the same manner as schedules and work systems to fit the child's developmental needs. Jigs form the fourth and final component of TEACCH, task organization (Schopler & Mesibov, 1995).

TEACCH also incorporates the use of prompts, directions, and reinforcers as secondary components whereas ABA (Applied Behavior Analysis) uses them as main components (Schopler & Mesibov, 1995). TEACCH emphasizes directions given to students must be short and straightforward. To give a child with autism a lengthy set of directions would most likely confuse the child or the child may only remember a small portion of the information given (Schopler & Mesibov, 1995).

Prompts can be used to help direct students in completing a task or transitioning to another activity (Schopler & Mesibov, 1995). They can be verbal, gestural, or physical assistance. An important point is that prompts should be offered before the child performs a task incorrectly to prevent the student from learning errors. An instructor should also be aware if he/she has the student's attention before giving the prompt. If the student is not paying attention to the prompt he/she will not benefit from the prompt (Schopler & Mesibov, 1995).

Reinforcement occurs when a behavior increases because the child has received something he/she wants (Schopler & Mesibov, 1995). The reinforcement can be positive or negative. When something is given to the child (e.g., praise, juice, a token, attention, etc.) the reinforcement is considered to be positive. A negative reinforcement occurs when something is subtracted from the environment (e.g., taken out of class, no longer having to do an assignment, etc.). Most of the general population is reinforced

intrinsically and through various natural reinforcers, such as respect, praise, and a feeling of accomplishment. However, children with autism many times do not attend to these natural reinforcers or they are not reinforcing, therefore, they may need to be more contrived (Schopler & Mesibov, 1995).

#### Positives:

TEACCH uses knowledge about how children with autism learn to create an environment that fosters their learning (Schopler & Mesibov, 1995). Structured teaching is used to make children feel relaxed during the school day rather than anxious about what they will be doing and how. Visual cues and instruction are used because Schopler and his colleagues noticed that children with autism learn and retain more information through the use of visual representations (1995). Parents are also normally involved in treatment and are taught how to implement TEACCH in their home (Schopler & Mesibov, 1995).

#### Negatives:

Maurice, Green, and Luce (1996) believe "TEACCH is aimed primarily at designing sheltered settings that help children make use of the skills they already possess, rather than at helping children to enter more 'normal' or 'typical' settings (p.46). During many of the activities children work independently, which does not foster the acquisition of their social skills. TEACCH activities tend to be repetitive motor activities such as sorting. They may hinder students' development of life skills and typical skills due to the fact that little time is spent working on these skills (Maurice et. al., 1996). "Clearly, the danger is that the individual does not learn to function in the non-autistic environment." (Jordan & Powell, 1995, p. 30).

# **Applied Behavior Analysis**

Theory:

Applied Behavior Analysis or ABA was not specifically designed for children with autism, however it has been used as an intervention with this population (Cumine et. al., 2000). ABA was developed from theories designed by Skinner that state "all behavior is learned and that behavior is also governed by its antecedents and consequences (Cumine et. al., 2000, p.48).. Skinner and those who agree with his theories are called behaviorists. Although Skinner is attributed with the start of the behaviorist movement, he was not the first to experiment with the idea that human behavior can be altered. Watson and Rayner, in 1920, trained a child to scream loudly whenever the child touched a small furry animal (Schloss & Smith, 1998). In 1927, Pavlov conditioned a dog to salivate to the sound of a ringing bell. In 1953, Skinner entered the scene and reported his findings of the three major principles (reinforcement, extinction, and punishment) of what he termed operant conditioning. He developed these principles through his work with pigeons. Skinner noticed an increase in the amount of pecking pigeons performed when they were given food and a decrease in pecking if the pigeons were not given food. Another behaviorist Albert Bandura, in 1965, found that individuals can learn new behavior by watching someone else perform the behavior. He termed his finding "modeling" (Schloss & Smith, 1998). Modeling, reinforcement, extinction,, and punishment all help to form the basis of Applied Behavior Analysis.

What is ABA:

"Applied Behavior Analysis employs methods based on scientific principles of behavior to build socially useful repertoires and reduce problematic ones" (Maurice, Green, Luce, 1996, p.29). Children are taught during one-to-one sessions and each



child's intervention is very individualized. "A high priority goal is to make learning fun for the child" (Maurice et. al., 1996, p.30). Those who are teaching the child should be well versed in ABA and trained on how to use it effectively. A well-meaning individual who is untrained may cause more damage than help by incorrectly using the intervention principles of ABA. Before receiving ABA intervention children with autism normally have been evaluated to determine their autistic diagnosis. The data collected during the evaluation can be used to determine the child's current skill levels, any emerging skills, as well as inappropriate behaviors (most likely attributed to the child's autism), and the child's skill deficits. This information can be used by those implementing the ABA intervention to determine what skills to target for intervention. Maurice, Green, and Luce suggest that when starting the intervention only a few skills should be selected to work on for the first few weeks (1996). "It is better to aim for fast acquisition in a limited number of areas than slow inconsistent progress in many areas" (Maurice et. al., 1996, pg.64 ). ABA covers the "full spectrum of activities essential to the child with autism" including self-help skills, social skills, speech, receptive language, and academic readiness skills (Harris & Weiss, 1998 pg.7).

### **Procedure:**

Once a child's current performance level has been determined the first step in creating an ABA intervention for the child is setting goals (Schloss & Smith., 1998). Goals state what one wants the child to be able to do within a particular amount of time. There are two types of goals: Short term and long term. Short-term goals can be accomplished in a relatively small amount of time and often contribute to the acquisition of long-term goals. Long-term goals take more time to accomplish. An example of a

short-term goal may be putting on sock's by oneself, while the long-term goal would be to dress independently. In order to determine whether or not the goal has been reached, one must measure the behavior addressed in the goal (Schloss & Smith, 1998). There are several different ways in which to collect data that later can be used to determine the intervention's effectiveness:

1. *Frequency Recording* In this type of recording, the number of occurrences of a behavior during a particular time period is recorded (Maurice et al., 1996, Schloss, & Smith, 1998).
2. *Duration Recording* This type of recording is used to determine the amount of time it takes a child to complete a response (Schloss & Smith, 1998).
3. *Latency Recording* The amount of time between a stimulus being presented and the start or end of a response.
4. *Interval Recording* For this recording method, a time period in which the child is observed is divided into equal segments of time. For each segment it is recorded whether or not the child is engaging in the behavior.
  - A. *Partial-interval* The behavior is reported as having occurred even if it only occurred during part of the segment.
  - B. *Whole-interval* The behavior must occur during the entire segment of time in order to be reported as having occurred.
5. *Momentary Time-Sampling* The period in which the child is observed is divided into equal segments of time. At the end of each segment the child is looked at. If he/she is engaging in the behavior it is recorded.

After the goals have been identified, the method of data recording determined, behavioral objectives must be written (Schloss & Smith, 1998). Behavioral objectives focus on a specific goal. A behavioral objective has several parts that include: the child, the environment, an "observable" behavior, the duration or amount of the behavior, and a mastery component. Here is an example of a behavioral objective: During a seatwork period, Johnny will remain in his seat for 10 consecutive minutes on 7 consecutive days. The behavior should also be well defined in order to prevent inconsistent data. In the example above, "Johnny must remain in his seat" can be interpreted in a variety of ways. Does his bottom have to be on the chair or is he still in his seat if he is sitting on his leg,

he is leaning forward causing his bottom to be off the chair, or if he is sitting on the back of the chair? By clearly defining the behavior the information can only be interpreted in one way lessening the amount of inaccurate data (Schloss & Smith, 1998).

The third step to creating an ABA intervention is to determine if there are any antecedents that occasion to appropriate or inappropriate behavior (Schloss & Smith, 1998). Antecedents may cause appropriate and inappropriate behavior to occur. For example, perhaps the teacher notices that the student's misbehavior increases during unstructured time. "Limiting the length of free time and requiring students to choose from a menu of carefully designed activities could reduce or eliminate inappropriate behavior" (Schloss & Smith, 1998, p.27). By determining appropriate and inappropriate antecedents to behavior an instructor can cause appropriate behavior to increase and inappropriate behavior to decrease.

Once antecedents to behavior have been identified, one must determine how to reduce inappropriate behavior and increase appropriate behavior using positive reinforcement, negative enforcement, and/or punishment (Schloss & Smith, 1998). Positive reinforcement is adding something to increase behavior whether it is appropriate or inappropriate. If a child is complimented for remaining in his/her seat and this behavior increases as a direct result, he or she has been positively reinforced. A teacher may observe that a child is engaging in self-injurious behavior or SIB when he/she is not receiving attention and the self-injurious behavior slows or stops when attention is given to the child; he/she has been reinforced to engage in SIB. The child has learned that when he/she performs SIB that almost immediate attention will result (Schloss & Smith, 1998).

Negative reinforcement occurs when a behavior increases because something was aversive was removed from the environment (Schloss & Smith, 1998). A child may want to escape from a task (that he/she finds aversive) and therefore screams. If that child does not have to do the task as a direct result of screaming the screaming behavior will increase because the child has learned "if I scream I can escape a task I do not like". Punishment is the opposite of reinforcement... Punishment occurs when a behavior decreases as a result of an aversive stimulus such as a time out or verbal reprimand being added to the environment (Maurice et. al., 1996) or when a preferred stimulus or activity is removed from the environment... However, it is recommended that punishment be as very sparingly and that most behavior should be changed through the use of reinforcement (Schloss & Smith, 1998).

Reinforcement for an appropriate behavior does not have to occur after every correct response, although initially the skills may need to be reinforced every time it occurs (Schloss & Smith, 1998). There are many schedules in which reinforcement may be implemented when a new behavior is being learned. At first the response should be reinforced every time he/she performs the desired behavior, however to prevent dependency on the reinforcer the reinforcement should eventually be faded out (Schloss & Smith, 1998).

Reinforcement can be used to affect children's behavior, however one must make sure when choosing a reinforcer that it is truly reinforcing to the child (Schloss & Smith, 1998). A major component of ABA is that reinforcement must be individualized (Maurice et. al., 1996). What one child might find reinforcing may be aversive for another child. Therefore some investigation should be done prior to the implementation

of ABA to determine what reinforces a particular child. One should "avoid using materials or reinforcers that are difficult to give and take away" (Maurice et. al., 1996, p.186). Avoiding such reinforcers will cause less problematic behavior from the child and will cause reinforcement periods to flow more easily.

Once the reinforcer has been determined, data must be collected (using the earlier chosen format) to determine whether or not the intervention is successful; meaning it has lessened an inappropriate behavior or increased an appropriate behavior to a significant degree (Schloss & Smith, 1998). Data should be collected for several weeks across many different days and times, in order to most accurately show the child's progress or lack of. Baseline data is information collected prior to the intervention in order to determine the child's level of performance before the intervention (Maurice et. al., 1996, Schloss & Smith, 1998). The baseline data can then be compared to the data collected during the intervention to determine the success of the intervention (Schloss & Smith, 1998). After the baseline data and intervention data has been collected it must be graphed. The graph should be carefully labeled to show the difference between baseline data and intervention data. There are several different designs that can be used to determine the effectiveness of an intervention (Schloss & Smith, 1998). The designs can be categorized as:

1. *Withdrawal/ Reversal Designs* In these designs, the baseline and intervention periods are alternating. Showing how the child performs with and without the intervention. This particular design can have three to four parts depending whether or not the intervention is implemented twice (i.e. baseline data, intervention data, baseline data, and possibly another set of intervention data).
2. *Alternating Treatment Designs* After the baseline data is collected, two to three different interventions are alternated to determine which intervention works the best of the child.
3. *Multiple Baseline Designs* In this particular design several behaviors are observed or one behavior over several settings, or one behavior in several children is observed. Once baseline data has been collected and seems consistent, the intervention is implemented in only one child, setting, or

behavior while baseline is continued to be collected for the other settings, children or behaviors. If the data shows a significant improvement where the intervention has been implemented the second behavior, setting, or child is given the intervention. This continues until all the behaviors, children,, or settings are participating in the intervention.

4. *Changing Criterion Design* In this design,, the amount of behavior must increase after the child has reached a particular level in order for the child to receive the reinforcer. For example, the child only has to arrive on time to two classes within a school day to receive the reinforecer once the child has done this for three consecutive days, the child must then arrive at three classes on time within a school day to receive the reinforcer.

Once the data has been collected and graphed within the context of a design, one must determine the effectiveness of the intervention. If the intervention is determined to be ineffective some of the variables such as reinforcers and the schedule of reinforcement may be changed and the process will start over (Schloss & Smith, 1998). However if it is determined to be effective the intervention will continue to be implemented and eventually will be faded out. Once the intervention has been faded, the skill may be generalized and periodically revisited to encourage maintenance of the skill. By generalizing the skill, or applying a skill to other situations and places, the skill becomes more useful (Maurice et, al., 1996).

### **Environment:**

"Initially teaching sessions are done in a space that has been arranged for this purpose" (Harris & Weiss, 1998, p.6). Later the setting may change to a variety of places in order to generalize the skill. Because children with autism are so easily affected by environmental stimuli, the room space selected for the initial teaching should be relatively quiet with as few distractions as possible (Harris & Weiss, 1998).

### **Delivery:**

Most ABA programs are 30 to 40 hours a week with the majority of the instruction being conducted on a one-to-one basis and should be conducted for at least two years (Harris & Weiss, 1998, Maurice et. al., 1996). During the one-to-one instruction skills are broken down into small pieces or steps of the whole skill to allow the child to learn skills that would be too difficult for him/her to handle if presented as a whole. This procedure is called task analysis (Harris & Weiss, 1998). For example, the task of washing dishes can be broken down into many steps which include tasks such as: turning on the faucet, adjusting the water temperature, plugging up the drain, pouring a specific amount of soap, filling the sink with water, turning off the water once it reaches the appropriate height, placing an appropriate amount of dishes in the sink, etc. As one can see, a task many people think of as fairly simple has many steps, which can be broken down and taught individually. Once the instructor has broken down the task, the first step in the task must be taught (Harris & Weiss, 1998).

"Teaching trials are repeated many times initially in rapid succession until the child performs the task readily, without adult delivered prompts" (Maurice et. al., 1996, 30). Prompts can be given (verbal, physical, gestural, positional, and modeled) to assist the child in completing the task (Schloss & Smith, 1998). For example, a child is shown a flash card with a word. The child looks at the word, but is unable to identify it. The teacher then begins to sound out the word. As she does this the child jumps in and says the word. If the prompt had not been presented the child may not have been able to read the word. A child may become dependent on a prompt if it is not eventually faded (Maurice et. al., 1996). There are four types of prompt fading techniques:

1. *Time Delay* Longer intervals are made between the presentation of the task and the prompt (Schloss & Smith, 1998).

2. *Graduated Guidance* This particular type of fading is used to fade physical prompts. The amount of physical guidance is gradually reduced.
3. *Most-to-Least* In this type of fading, the first prompt used in a full physical prompt which is then changed to a gestural or modeled prompt, and finally only a verbal prompt is given.
4. *Least-to-Most* Here a child tries to respond on his/her own. If the child is unable to respond the level of prompt gradually increases until the child is able to respond (Maurice et. al., 1996, Schloss & Smith, 1998)

#### Greenspan's Floor Time:

In Greenspan's floor time, based on the principles of ABA, the therapist/instructor must get down at the child's level by sitting on the floor (Greenspan, 1992). The child and therapist must be relaxed, and the therapist must try to match the child's mood. The goal of floor time is to engage the child in two-way communication. In Greenspan's two-way communication, the adult says something, gestures to the child, or hands the child something. The child then responds either verbally or through actions and then the adult responds back to the child (Greenspan, 1992). This type of ABA is very relaxed.

#### Lovass's Discrete Trial Instruction:

In many ABA models, discrete trial training is used to teach children skills (Cohen, 1998). What does this mean? A child is taught one-on-one a specific new skill in a well-defined trial (Browder, 2001, Harris & Weiss, 1998, Holmes, 1998). The instruction is intense and is continually repeated throughout the day. To begin the instruction the child is given a command (Browder, 2001, Maurice et. al., 1996). The child can respond in three ways. The first is to not respond at all, in which case he/she is given a prompt. The child may respond, but respond incorrectly. When this happens the child is given punishment in order to try and extinct the inappropriate response. Finally,



the child could respond correctly and be reinforced for this correct response. Between each trial the child is given a break called a between trial interval (Browder, 2001, Harris & Weiss, 1998, Maurice et. al., 1996). This interval helps the child to not be confused as to what the command is and what is wanted of him/her. Records are kept of how the child responds to each trial so that adaptations can be made and it can be determined whether or not the child has mastered the skill (Harris & Wiess, 1998). Discrete trial instruction is conducted about 40 hours a week and last for up to two years (Holmes, 1998). "The theory of such intensive discrete trial training is that, by the end of treatment, the child will either be able to enter a regular education setting, or will need highly specialized, long-term services (Holmes, 1998, pg.79)

### **Early Intervention:**

It is highly recommended that ABA intervention start before five years of age (Harris & Weiss, 1998, Maurice et. al., 1998). As a child gets older the brain loses its plasticity and ability to change. It is believed that early ABA intervention may change the brain of children with autism, which suggests the need for early intervention (McEachin et. al., 1993). This is also the time in which most of "the child's development occurs" therefore it is easier to shape the child's behavior at this stage of development (Harris and Weiss, 1998, p.8).

### **Studies:**

The most famous study, however not the only study, looking at the effects of ABA was conducted by O. Ivar Lovaas at UCLA during the 1970's (Harris & Weiss, 1998). Lovaas treated 19 children with autism under the age of 40 months. He worked with the children for 40 hours a week during a two-year period. His control group

consisted of 19 children also under the age of 40 months. However these children received only 10 hours of treatment a week during the two-year period. At ages six and seven, the children were reevaluated. "He found that nearly half(47%) of the children in the intensive treatment condition were functioning at a normal level intellectually, and were in regular education classes" (Harris & Weiss, 1998, p.29); compared to the control group in which only one child made gains similar to the experimental group. Forty-two percent of the experimental group had been placed in language-delayed or learning delayed classes and were classified as having mild mental retardation. The final two children in the experimental group had been classified as profoundly mentally retarded. Although all the students were not developing in the normal range almost half were and another large portion of the children showed only mild mental retardation, which suggested that the ABA intervention was effective for many of the participants (Maurice et. al., 1996).

The May Institute conducted a study with 14 children who had an average age of 43 months (Maurice et. al., 1996). These children received between 15 and 25 hours of ABA intervention a week, some for only one year and others for two years. The most gains were seen in children who participated for two years. During each year, approximately 20 behavioral objectives were met. No control group was present in this study making it difficult to determine its effectiveness. Most children did show improvement, however, they did not make the gains of the children who participated in Lovaas's study (Maurice et. al., 1996).

A third study was conducted by the Murdoch Early Intervention Program. Nine children with an average age of 39 months received 18.75 hours of treatment each week,

during a two-year period (Maurice et. al., 1996). The control group consisted of five children who received no behavioral treatment.. "At the end of the two-year period, four of the nine children in the treatment group had made substantial gains" (Maurice et. al., 1996, p.34). Another four made average improvements and the last students made only minimal gains (Maurice et. al., 1996). Most participants in the experimental group improved their IQ and other areas of development.. However a change in the stereotypical behaviors of the experimental group was not found (Maurice et. al., 1996).

### **Positives:**

ABA has been effective in helping very young children achieve slightly below average to average levels of functioning (Maurice et. al., 1996, Schloss & Smith, 1998). It is a strategy can be easily learned by teachers, professionals, and caregivers who interact with the child on a normal basis. Once an ABA intervention is in place it is checked and evaluated for its effectiveness and a wide range of skills and behaviors can be targeted and improved through ABA intervention (Schloss & Smith, 1998).

### **Negatives:**

Even though ABA can be easily learned it is not always used correctly which can cause the child to regress. The child may also not retain or generalize the skills he/she has learned which can make ABA ineffective (Schloss & Smith, 1998, Scholper & Mesibov, 1995). Scholper and Mesibov state that, for some children, they may not be able to perform the skill without the presentation of the reinforcement (1995). Others "argue that an individual has free will that allows him or her to choose how to behave. Therefore, use of applied behavior analysis to change an individuals behavior is a violation of his or her free will" (Schloss & Smith., 1998, p.9). Another issue with ABA

is that while it deals with changing the child's behavior it does not deal with the psychological roots of behavior (Scholper & Mesibov, 1995).

## Theory:

In 1979, Dr. A. Jean Ayres developed the theory of sensory integration from her study of neuroscience specifically physical development and neuromuscular function (Fouse & Wheeler, 1997, Hatch-Rasmussen, 2000, Henry, 1997, Kranowitz, 1998).

Sensory integration can be defined as the "innate neurobiological process and refers to integration and interpretation of sensory stimulation from the environment by the brain" (Cunningham, 2002, [www.sensory.integration.btinternet.co.uk/page5.htm](http://www.sensory.integration.btinternet.co.uk/page5.htm)). Children with autism do not develop their senses through play like most children especially the vestibular, tactile, and proprioceptive senses because of a dysfunction in the central nervous system (Hatch-Rasmussen, 2000, Kranowitz, 1998).

The vestibular sense deals with the inner ear canals, which inform the brain where the head is located in space (Hatch-Rasmussen, 2000, Kranowitz, 1998). Children whose vestibular sense is not working properly most likely will react in one of two ways: (1) the child will be hypersensitive, unwilling to engage in activities such as swinging, problems with walking up/down stairs, problems climbing, and will appear clumsy; (2) the child will be hyposensitive and actively seeks out stimulation to vestibular sense by engaging in activities such as whirling, jumping, and/or spinning (Hatch-Rasmussen, 2000).

The tactile sense "includes the skin's surface that sends information to the brain" about temperature, pain, pressure, and light touch (Hatch-Rasmussen, 2000, [www.autism.org/si.html](http://www.autism.org/si.html)). The dysfunction causes abnormal messages to be sent to the brain which then interfere with normal brain functioning and can cause "the brain to be over-stimulated and may lead to excessive brain activity, which can neither be tuned off nor organized" (Hatch-Rasmussen, 2000, [www.autism.org/si.html](http://www.autism.org/si.html)). A child with a non

properly functioning tactile sense may withdraw from touch, refuse to eat food with a particular texture, may not want to wear clothing, may not want to have hair/face washed, may not like to get dirty, may be either hyper/hyposensitive, may isolate him/herself, may be irritable, may be distractible, and/or be hyperactive (Hatch-Rasmussen, 2000, Kranowitz, 1998).

The proprioceptive sense can be defined as the parts of one's muscles, joints, and tendons that tell the brain how the body is positioned (Hatch-Rasmussen, 2000). Problems with this system may manifest itself as clumsiness, a lack of awareness of one's body position in space, odd body posture, eating in a sloppy manner, and resistance to new motor activities (Hatch-Rasmussen, 2000, Kranowitz, 1998). A. Jean Ayres believed that children whose tactile, vestibular, and proprioceptive senses did not function correctly would have problems with their fine/gross motor skills, speech/language delays, adjusting to new situations, as well as be over/under responsive stimuli, low/high activity, constant motion/fatigue, impulsiveness, distractibility, withdrawn, have academic underachievement, and show aggression due to frustration (Hatch-Rasmussen, 2000).

Children can be diagnosed as having sensory integration problems through the use of the Sensory Integration and Praxis Test. It is a standardized test with 17 sub-tests designed to specifically identify which senses and to what extent those senses are not functioning (Mulligan, 2000). Once the child's sensory profile has been identified, a therapy program can be designed.

What is Sensory Integration Therapy:

Sensory Integration Therapy aims to reorganize the way a child's brain interrupts sensory stimulation by engaging the child in different types of stimulation activities (Cunningham, 2002). The type of stimulation and the activities used are determined by what the child's sensory profile looks like. For example, if a child has a severe dysfunction in his/her tactile sense then most of the activities will be directed toward working on improving the way the brain interrupts tactile stimulation. In most cases, an occupational or physical therapist is the person who performs sensory integration therapy and determines what type of activities the child needs (Hatch-Rasmussen, 2000, Fouse & Wheeler, 1997, Kranowitz, 1998). However parents should collaborate with the physical therapist to ensure the child's needs are met (Hatch-Rasmussen, 2000, Fouse & Wheeler, 1997, Kranowitz, 1998).

Once treatment begins the therapist will inform parents of activities they can do at home to help their child (Kranowitz, 1998). The classroom teacher may also be asked to make adaptations for the child in the classroom (Kranowitz, 1998). The goals of the treatment are to "provide the child with sensory information which helps to organize the central nervous system, assist the child in inhibiting and/or modulating sensory information, and assist the child in processing a more organized response to sensory stimuli" (Hatch-Rasmussen, 2000, [www.autism.org/isi.html](http://www.autism.org/isi.html)).

### **Procedure:**

Most sensory integration therapies include the following characteristics: "active participation, child directed, individualized treatment, ... (and) purposeful activity" (Cermak & Henderson, 1989, [www.sinet.org](http://www.sinet.org)). Some of the activities the therapist may recommend or deem applicable for a particular child include:

### Tactile Activities

- *Rub-a-Dub-Dub:* The child rubs soaps, lotions, sponges, luffas, etc. of different textures on his/her body (Kranowitz, 1998).
- *Water Play:* Fill the sink or other large container with water. Give the child plastic containers, pitchers, cups, water pumps, turkey bastes, etc. that can be used to scoop and pour water (Kranowitz, 1998).
- *Finger Painting:* Have the child place his/her hands in the paint and use them to paint a picture. Sand can be mixed into the paint to give it a different texture. Items such as shaving cream, peanut butter, and other such substances can be used instead of paint (Kranowitz, 1998).
- *Feelie Box:* Place items of varying size and texture in a shoe box with a hole in the top. Have the child reach in and try to determine what kind of object he/she is touching, without looking at the object (Kranowitz, 1998).

### Vestibular Activities

- *Rolling:* Have the child roll around in a box, which has the top and bottom cut out. Towels can also be used for a different experience.
- *Swinging:* Swinging on any kind of swing, in a back and forth motion (Fouse & Wheeler, 1997, Kranowitz, 1998).
- *Riding Vehicles:* Have the child ride a bike, a tricycle, or other type of riding vehicle for children (Kranowitz, 1998).
- *Balancing on a teeter-totter:* A true teeter-totter or a home-made one will work. Have the child walk back and forth on the teeter-totter to work on balance (Kranowitz, 1998).

### Proprioceptive Activities

- *Carrying Heavy Loads:* Have the child carry objects that are heavy such as a laundry basket that is full, grocery bags, books, buckets of water, etc. (Fouse & Wheeler, 1997, Kranowitz, 1998).
- *Hanging by the arms:* Have the child do chin-ups on a chin-up bar or travel on monkey bars (Kranowitz, 1998).
- *Hermit Crab:* Fill a bag with dry rice or beans then place it on the child's back. Have the child crawl around the room pretending that he/she is a crab and the bag is his/her shell (Kranowitz, 1998).
- *Playing catch:* Find a big ball, pillow, or other object to throw back and forth (Kranowitz, 1998).



These are only some of the many activities that can be used to improve a child's sensory perception, many more are listed in Carol Stock Kranowitz's book The Out-of-Sync Child, 1998.

The occupational or physical therapist might also have the child engage in activities related to the child's motor skills, motor planning, bilateral coordination, auditory skills, and visual skills (Kranowitz, 1998). Examples of these activities include: Fine motor- manipulating small toys and objects, motor planning - going through an obstacles course, bilateral coordination - clapping rhymes, auditory skills - telling a story in which people take turns adding lines, and visual skills - putting together jigsaw puzzles (Kranowitz, 1998).

For home-based sensory integration therapy, the therapist might recommend that the parents conduct a sensory diet daily at home to improve the child's ability to interpret and use sensory information (Kranowitz, 1998). A sensory diet is "a planned and scheduled activity program that an occupational therapist develops specifically to meet the needs of the child's own nervous system" (Kranowitz, 1998, p.186). Within a sensory diet different types of activities (alerting, organizing, and calming) are rotated to help the child have a sensory equilibrium (Kranowitz, 1998). They can be performed in any order or time-frame, whatever works the best for the child (Kranowitz, 1998). Several guidelines must be followed when implementing a sensory diet: (1) there must be a specific time schedule, (2) the activities must be what the child wants to do, (3) the child must direct the play, and (4) periodically the sensory diet should be evaluated for effectiveness (Kranowitz, 1998). Here is a list of some of the possible activities that might be used in a sensory diet:

Alerting Activities: "Benefit the undersensitive child who needs a boost to become effectively aroused" (Kranowitz, 1998, p.187).

- Eat crunchy foods such as popcorn, chips, celery, apples, etc. (Kranowitz, 1998).
- Take a shower (Kranowitz, 1998).
- Jump on things such as a trampoline (Fouse & Wheeler, 1997, Kranowitz, 1998)
- Bounce on a large therapy ball (Fouse & Wheeler, 1997, Kranowitz, 1998)

Organizing Activities: "Help regulate the child's responses" (Kranowitz, 1998, p. 187).

- Chew foods such as granola bars, gum, licorice, etc (Kranowitz, 1998).
- Hang on a chin-up bar (Kranowitz, 1998).
- Pushing or pulling objects that are heavy (Kranowitz, 1998).
- Being upside down (Kranowitz, 1998).

Calming Activities: "Help the oversensitive child decrease hyper-responsiveness to sensory stimulation" (Kranowitz, 1998, p.188).

- Suck on things such as suckers, frozen fruit pops, hard candy, etc. (Kranowitz, 1998).
- Use the whole body to push on a wall (Kranowitz, 1998).
- Swing back and forth or rock in a rocking chair (Kranowitz, 1998).
- Give the child a back rub (Kranowitz, 1998).

It is recommended that a sensory diet be conducted daily to help the child be able to organize and use sensory stimulation.

There are several things classroom teachers can do to help a child with autism deal with his/her sensory problems (Kranowitz, 1998). They can make modifications to the classroom environment by reducing the amount of sensory stimulation in the room (Kranowitz, 1998). For example, the teacher can place the child in a place he/she feels safe, comfortable, and where he/she will have as little as possible physical contact with other children, keep the bulletin boards and posters down to a minimum, make sure objects in the room don't move, keep the blinds closed, keep noises down to a minimum,

don't sit the child next to things in the room that make noise (i.e. the fish tank), and keep objects with odors away from the child's desk area (Kranowitz, 1998). The following adaptations can also be made to classroom management to help the child regulate his/her sensory input: have a daily routine, have fluid transitions, and have movement activities within the normal class day (Kranowitz, 1998). A child with autism also needs help with organization, therefore, the teacher simplify his/her instruction and not rush activities when he/she is behind schedule. To help the child be more engaged in listening and become an active listener, the teacher can give the child manipulates to help him/her learn concepts and can allow the child to explore subjects that interest him/her. By anticipating what the child may have problems with and making adaptations or allowing the child to do alternative activities he/she can feel safe in his/her environment (Kranowitz, 1998). Finally, the teacher can help a child who needs sensory integration therapy by changing his/her own behavior (Kranowitz, 1998). The teacher should emphasize the positive things the child does, speak in a low tone of voice, use physical contact such as putting a hand on the child's shoulder for feedback, and not to be discouraged if the child performs differently than other students (Kranowitz, 1998).

Basically, sensory integration therapy involves using activities and changing the child's environment to enhance the his/her ability to take in the sensory stimulation in his/her environment and use that information (Kranowitz, 1998).

Positives:

Sensory integration therapy tries to get at what SI researchers believe is the root of the problem for children with autism. Many of the activities are fun for children and seem to help them deal with the world around them and the activities are individualized

according to each child's needs (Kranowitz, 1998). By helping the child deal with his/her sensory problems, the child will be better able to engage in skills that incorporate those senses rather than the child finding the skill aversive and trying to avoid engaging in that skill (Holmes, 1998).

#### Negatives:

As of today there are few studies on the effectiveness of sensory integration therapy that have proven to be scientific and therefore it is still unknown exactly how effective sensory integration therapy is (Cermak & Henderson, 1999). Sensory integration therapy does not teach specific skills, which may be a problem for children with autism, and it does not work for all children (Fouse & Wheeler, 1997). Critics say that SI therapy does not benefit areas such as motor development, decrease in self-injurious behavior, and it does not enhance language acquisition (Maurice et al., 1996).

## Theory:

Schwartz, Garfinkle, and Bauer believe that communication difficulties cause delays in other areas of development (1998). The pictures exchange communication system (PECS) was developed by Andrew Bondy and Lori Frost to help children with many different disorders to communicate in a functional manner that can be used in a variety of situations (Cumine et al., 2000, Schwartz et al., 1998).

## What is PECS?

PECS is an augmentative communication system that uses 2 by 2 inch simplistic pictures as a mode of communication (Schwartz et al., 1998). Children do not need to have any prerequisite skills in order to use PECS, which allows for it to be versatile and easy to implement according to Schwartz and his colleagues (1998). Through PECS, children are taught to generalize their newly learned communication skills and to interact with others through this communication system. In a study conducted by Schwartz and his colleagues, it was found that it takes on average 14 months for a child to be able to use PECS at a mastery level (1998). Since it can be learned fairly quickly by children, PECS is useful for children who have little or no communication capabilities. Schwartz's study also found that 44% of the participants in their study had a marked increase in their verbal communication (1998). Showing that PECS not only can be used as an augmentative communication device, but also as a way to help children with their verbal language skills.

## Procedure:

The first step for implementing PECS, as stated by Schwartz and his colleagues, is to do a reinforcer assessment in order to see what the child wants and perceives as

reinforcing (1998). Once the reinforcer has been identified, instruction begins. Two adults work with the child: one is the communicative partner and the other is an instructor who prompts the child. During the phase I, an item that has been identified as reinforcing is placed in front of the child, but slightly out of reach (Bondy & Frost, 1993, Schwartz et al., 1998). The 2 by 2-inch picture of the item is placed in front of the child and within his/her reach. The instructor helps/prompts the child to pick up the picture and hand it to the other adult. Once the partner has the picture he/she says "oh, you want (insert the item)", and gives the item immediately to the child. Immediacy in giving the item after receiving the picture is essential. This allows the child to pair the picture with receiving the item. The physical prompting of the instructor should be faded once the child has paired the picture with the object so that the child does not become dependent on the prompt. Phase I has been achieved when the child is able to pick up the picture, hand it to the communication partner, and then the child receives the item without any prompting (Bondy & Frost, 1993, Schwartz et al., 1998). During phase II, the child must pick a particular item from a communication board. Once he/she has the picture he/she must deliver it to the communicative partner. The partner then gives the child the item he/she has requested. Throughout this phase, the communication partner should gradually move farther away so that the child must travel a greater distance in order to get the item (Bondy & Frost, 1993). The communication board should also be moved farther away so that he/she learns how to travel to the communication board when it is not directly given to them. At the end of this phase, the child should be able to go to the communication board, select the symbol for the desired item, and then take it to the communication partner. Phase II works on the child being able to discriminate between

pictures. The child is given a communication board with a variety of pictures and the child must pick a designated picture from the communication board (Bondy & Frost, 1993, Schwartz et. al., 1998). For the fourth phase, children learn how to build sentences. At first the child is given a sheet with the "I want" sign attached. A picture is then selected by the child and placed after the "I want" symbol.. The sheet is then given to the communication partner and the child is given the desired item. Gradually the child is graduated to a level where he/she must select the "I want" sign and place it as well as a symbol for an object on a sentence strip sheet.. Again the sentence strip is given to the communication partner.. In the study conducted by Schwartz and his colleagues, they also has children request items using just one picture and sentence strips from their peers (1998). In the final phase of PECS, children are taught how to answer questions, such as "What do you see" (Bondy & Frost, 1993).

#### Positives:

PECS can be learned easily by children of varying levels of communication problems and is effective (Bondy & Frost, 1993, Schwartz et. al., 1998). By developing communication skills children can tell others what their wants and needs, helping them to feel somewhat in control of their world. It also helps children to develop verbal skills as well, as seen in the study conducted by Schwartz and his colleagues (1998). One of the most appealing things about PECS is that it is affordable.

#### Negatives:

As of today, there are no studies looking at the long-term affects of PECS which does leave some questions as to how children using PECS will be able to communicate as

they get older. PEes also does not teach specific skills; it only teaches children how to communicate.



## **Conclusion**

Autism is a disorder in which children have difficulties interacting with others, communicating, as well as engaging in stereotypical behaviors. Today, we still have no answers as to the cause of autism, although many theories have been speculated. Because we do not know the cause of autism, it is hard to get at the root of the children's problem in order to develop effective interventions for them. Since the time of Kanner, professionals have been trying to devise an intervention that will work for all children with autism of any age group or capability level. As of today, they have not succeeded. However this does not mean that there are not some valid interventions that seem to work for some but not all children.

The TEACCH approach devised by Eric Schopler and his colleagues tries to help children make sense of their world by giving the child a very structured and predictable environment. Applied Behavior Analysis (ABA), tries to change the child's behavior through altering antecedents and providing reinforcement. Sensory Integration therapy (SI therapy) tries to change the way the child takes in and organizes stimuli in the environment. The Picture Exchange Communication System (PECS) teaches children with autism how to communicate with the people in their environment. Each theory is based on an idea of how the child with autism thinks and how his/her brain works.

Intervention	What type of child should this intervention be used for?	Who can use the intervention?	Downfalls of the intervention?	Positive aspects of the intervention?
TEACCH	This intervention should be used	Anyone can be taught to use TEACCH.	<ul style="list-style-type: none"> <li>It is a sheltered setting.</li> </ul>	<ul style="list-style-type: none"> <li>Children feel relaxed and safe</li> </ul>

	for children who are capable of performing a variety of skills, but need a structured environment in order to perform the skills.		<ul style="list-style-type: none"> <li>• Children work independently, which does not foster acquisition of social skills</li> <li>• Repetitive activities</li> </ul>	<ul style="list-style-type: none"> <li>• Visual cues are used to help children understand what is occurring during the day and what to do at their stations</li> </ul>
ABA	This intervention is for children who do not have skills and need to be taught skills in any or all domains.	Anyone can be taught to use ABA.	<ul style="list-style-type: none"> <li>• It is not always used correctly</li> <li>• Child may not retain or generalize skills</li> <li>• The child may become reliant on the reinforcer in order to perform the skill</li> <li>• It violates a child's free will</li> <li>• Does not deal with psychological roots of behavior</li> </ul>	<ul style="list-style-type: none"> <li>• Children have achieved lightly below average to average levels of functioning</li> <li>• The program is periodically checked and evaluated</li> <li>• A wide range of skills and behaviors can be targeted and improved</li> </ul>
SI Therapy	This intervention should be used for children who have sensory problems.	Anyone can be taught to use SI Therapy.	<ul style="list-style-type: none"> <li>• Few studies have been done on its effectiveness</li> <li>• Does not teach specific</li> </ul>	<ul style="list-style-type: none"> <li>• Activities are fun for the child</li> <li>• Seems to help children deal with the world</li> </ul>

			skills <ul style="list-style-type: none"> <li>● It does not work for all children</li> <li>● It does not benefit motor skill development</li> <li>● It does not decrease self-injurious behavior</li> <li>● It does not enhance language acquisition</li> </ul>	around them <ul style="list-style-type: none"> <li>● Activities are individualized according to the child's needs</li> </ul>
PECS	This intervention should be used for those children who have communication problems, which cause them to be unable to function in their world.	Anyone can be taught to use PECS.	<ul style="list-style-type: none"> <li>● There are no-longer term studies on the effects of PECS</li> <li>● It does not teach specific skills</li> </ul>	<ul style="list-style-type: none"> <li>● PECS can be learned easily</li> <li>● PECS is effective</li> <li>● It helps children to communicate</li> <li>● Helps develop verbal skills</li> <li>● It is affordable</li> </ul>

ABA, TEACCH, SI therapy, and PECS all are valid interventions that may work for some children and not others. Many times, it is trial and error in determining what will work for a specific child. Therefore, before an intervention is implemented the therapist/instructor should look at several interventions and decided which seems to fit that particular child the best..

## References

- Autism and vaccine research: Is there any scientific evidence that proves a linkage between autism and vaccines? (2001). National Institute of Child Health and Human Development [On-line]. Available: <http://www.nichd.nih.gov/publications/pubs/autism2.htm> [2001, December 28].
- Bondy & Frost.. (1993). Proceedings of Association for Behavior Analysis: PECS.
- Browder, D. M. (2001). Curriculum and assessment for students with moderate and severe disabilities. New York, NY: The Guilford Press.
- Cermak, S. A. & Henderson, A. (1990). The efficacy of sensory integration procedures. [On-line]. Available: <http://www.sinetwork.org/Articles/EfficacyofSIPProcedureS/Efficacyarticle.htm> [2002, March 12]
- Cohen, S. (1998). Targeting autism: What we know, don't know, and can do to help young children with autism and related disorders. London: University of California Press.
- Cumine, V., Leach, J., & Stevenson, G. (2000). Autism in the early years: A practical ~ London: David Fulton Publishers.
- Dorman, B. (1998). Intensive behavioral intervention. Autism-society [On-line]. Available: [http://www.autism-society.org/packages/discrete\\_trial.html](http://www.autism-society.org/packages/discrete_trial.html) [2000, March 28].
- Freeman, B. J., (2000). Diagnosis of the syndrome of autism: Questions parents ask. Autism-society [On-line]. Available: [http://www.autism-society.org/packages/getstart\\_diagnosis.html](http://www.autism-society.org/packages/getstart_diagnosis.html) [2000, March 28].
- Fouse, B & Wheeler, M. (1997). A treasure chest of behavioral strategies for individuals with autism. Arlington, TX: Future Horizons, Inc.
- Greenspan, S. I. (1992). Infancy and early childhood: The practice of clinical assessment and intervention with emotional and developmental challenges. Madison, CN: International Universities Press Inc.
- Harris, S. L., & Weiss, M. J. (1998). Right from the start: Behavioral intervention for young children with autism. Bethesda, MD: Woodbine House Inc.
- Hatch-Rasmussen, C. (2002). Sensory integration, Autism-society. [On-line]. Available: [www.autism.org/si.html](http://www.autism.org/si.html) [2002, March 12].
- Henry, B. (1997). Sensory integration. [On-line]. Available: <http://webhome.idirect.com/~horn2luv/sensory.html> [2002, March 12].
- Homles, D.L. (1998). Autism through the Lifespan: The Eden Model. Bethesda, MD: Woodbine House.
- Jordan, R. & Powell, S. (1995). Understanding and teaching children with autism. West Sussex: John Wiley & Sons Ltd.
- Kranowitz, C. S. (1998). The out-of-sync child: Recognizing and coping with sensory integration dysfunction. New York, NY: The Berkley Publishing Group.
- Maurice, C., Green, G., & Luce, S. C. (1996). Behavioral intervention for young children with autism: A manual for parents and professionals. Austin, TX: PRO-ED, Inc.
- Miller, L. J. & Kinnealey, M. (1993). Researching the effectiveness of sensory integration. [On-line]. Available: [http://www.sinetwork.org/Articles/Researching%20Effectiveness%20of%20SI/cover\\_research\\_effectiveness.htm](http://www.sinetwork.org/Articles/Researching%20Effectiveness%20of%20SI/cover_research_effectiveness.htm) [2002, March, 12].

- Panerai, S., Ferrante, L., & Caputo, V. (1998). Use of structures teaching for treatment of children with autism and severe and profound mental retardation. Education and Training in Mental Retardation and Developmental Disabilities, 33, (4), 367-374.
- Powell, S. (2000). Helping children with autism to learn. London: David Fulton Publishers, Ltd.
- Powell, S. & Jordan, R. (1997). Autism and Learning: A guide to good practice. London: David Fulton Publishers, Ltd.
- Schloss, P.J., & Smith, M.A.. (1998). Applied behavior analysis in the classroom. Needham Heights, MA: Allyn & Bacon.
- Schopler, E. & Mesibov, G. B. (1995).. Learning and cognition in autism. New York, NY.: Plenum Press.
- Schwartz, I. S., Garfinkle, A. N., & Bauer, J. (1998). The picture exchange communication system: communicative outcomes for young children with disabilities. Topics in early childhood special education, 18, (3), 144-159.